Original Article :

Prevalence of Gastro-esophageal Reflux Disease and Its Risk Factors Among Medical Students in Medina.

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Abstract

Background and aim:

Gastroesophageal Reflux Disease is one of the most common gastrointestinal disorders presenting in general medical practice which adversely affects the quality of life. We Aimed to determine the prevalence of Gastroesophageal Reflux Disease and its risk factors among medical students in Medina, Saudi Arabia.

Methods:

A cross-sectional study was conducted from January to June 2021 using a pre-designed questionnaire distributed among medical students in Medina, Saudi Arabia. The questionnaire was composed of questions regarding sociodemographic and lifestyle characteristics. The diagnosis of Gastroesophageal Reflux Disease was made using the GERDQ questionnaire. The data were analyzed by Statistical Package for Social Sciences version 27.

Results:

Out of the 385 participants, the majority were females (65.7%). Based on ≥8 GERDQ score, 14.8% had Gastroesophageal Reflux Disease. The only significant risk factor was family history (36.8%). The prevalence of the remaining factors among the Gastroesophageal Reflux Disease group in the following descending order: skipping breakfast (66.7%), normal body mass index (62.5%), sleeping <7 hours/day (57.9%), fried food (57.9%), coffee and tea intake (50.9%), spicy food (49.1%), eating main meals within 10 min (43.9%), fast food (42.1%), sleeping within <1 hour of dinner (31.6%), exercising 2-3 times/week (26.3%), carbonated drinks (22.8%), smoking (10.5%), and non-steroidal anti-inflammatory drugs use (5.3%).

Conclusion:

The prevalence of Gastroesophageal Reflux Disease was 14.8%. A significant correlation was observed between Gastroesophageal Reflux Disease and a positive family history. Emphasis should be focused on implementing interventions aimed at increasing the awareness of this disease among medical students.

Keywords:

Gastroesophageal Reflux Disease, Prevalence, GERDQ, Risk factors, medical students.

Introduction

Gastroesophageal Reflux Disease (GERD) is one of the most common gastrointestinal disorders presenting in general medical practice [1]. According to a systematic review and meta-analysis published in 2020, the worldwide prevalence of GERD was 13.98%. There was significant variation in the prevalence of GERD among countries, with the highest prevalence reported in Turkey (22.40%), and the lowest prevalence in China (4.16%) [2]. Furthermore, the prevalence of GERD among the general population in Saudi Arabia was found to be 17.8% according to the most recent cross-sectional study conducted in 2019 [3]. GERD happens when stomach contents reflux into the esophagus causing symptoms[1]. They are classified into typical symptoms that include heartburn, regurgitation, and dysphagia, and atypical symptoms such as coughing, chest pain, and wheezing [4]. GERD is diagnosed clinically based on the patient's symptoms and their response to treatment [3]. If there is no response or there is suspicion of GERD complications, pH-measurement using endoscopy is indicated [5]. GERD is associated with several complications such as esophageal stricture, Barrett's esophagus, and esophageal adenocarcinoma [3].

Several risk factors are associated with GERD, such as age, gender, family history, certain types of food and drinks, non-steroidal anti-inflammatory drugs (NSAIDs), and sedentary lifestyle. Well recognized risk factors are a family history, obesity, and smoking [3]. Such risk factors may influence GERD through multiple mechanisms including a delay of gastric emptying, relaxation of the lower esophageal sphincter, and stimulation of gastric acid production[6–8].

Rationale:

GERD is a common issue that adversely affects the quality of life. The research in Saudi Arabia is not sufficient to provide a national estimate for the prevalence of GERD among medical students. In a study conducted among medical students at King Abdul-Aziz University in Saudi Arabia, GERD showed a prevalence of 25.9% [9]. Medical students may have some difficulty maintaining a healthy lifestyle as they are occupied by challenging academic and clinical education, which probably increases their susceptibility to GERD. Thereby, our aim in this study was to determine the prevalence of gastroesophageal reflux disease and its associated risk factors among medical students in Medina, Saudi Arabia.

Subjects and Methods

Study design and participants

An observational cross-sectional study was conducted from January to June 2021

using a pre-designed questionnaire distributed among medical students in Medina, Saudi Arabia. The criteria for selecting subjects were as follows: medical students from Taibah University and Al-Rayan Colleges, in their second to sixth academic year, and including both genders.

Sample size

For sample size, a minimum of 385 participants was required to achieve a precision of ±5% with a 95% confidence interval. The sample was calculated using the Sampsize website [10].

Procedure and data collection

A structured electronic Arabic questionnaire that meets our study objectives was adapted from a previous study conducted at Shaqra University [1]. The questionnaire consists of 3 parts: 1) sociodemographic data, 2) GERD risk factors and 3) GERDQ questions (Appendix 1). We modified the adapted questionnaire to suit the study population in the following manner: 1) academic year: we replaced the statement of being in the last academic year to select the current academic year; 2) college major: we removed the question of college major because our research was restricted to medical students; 3) we added a question to distinguish between Taibah University and Al-Rayan Colleges students; 4) we removed the questions concerning the frequency of GERD symptoms because it is not the aim of our study; and 5) we added NSAIDs use option for the pain relief question as they have been linked to adverse gastrointestinal events.

We used the GERDQ questionnaire because it has been proven to be useful as an initial diagnostic approach for primary care which assesses six factors with a sensitivity of 65% and specificity of 71% [11]. Participants with a total score of ≥8 were considered to have GERD, while those with a score of <8 were not considered diseased. The score was calculated based on the frequency of six factors: 1) heartburn, 2) regurgitation, 3) epigastric discomfort, 4) nausea, 5) sleep disturbance due to heartburn, and 6) the use of over-the-counter heartburn medicines.

Statistical analysis

Data analyses were performed using Statistical Package for Social Sciences (SPSS) version 27.0. Categorical variables were described in terms of frequencies and percentages. Numerical variables were described as mean and Standard Deviations (SD). The Chi-square test was used to compare the categorical variables between the GERD and non-GERD groups. Pearson Correlation test was used to assess the relationship between age and GERD score. We used an ANOVA test to compare be-

tween different academic years and GERD score. A P value <0.05 was considered statistically significant.

Ethical consideration

Approval to conduct the study was obtained from the Research Ethics Committee of Taibah University, College of Medicine. The research objectives were explained to the participants and their informed consent was obtained taking their confidentiality into consideration.

Results

In this study, a total of 385 electronic questionnaires were distributed with a complete response rate of 100%. Table 1 shows the sociodemographic and general characteristics for those participants.

Table 1: Socio-demographic and general characteristics of 385 participants

n (%)	Parameters
Age (years) (mean [SD]) [range]	21.6 (1.5) [18-27]
Gender	
Female	253 (65.7%)
Male	132 (34.3%)
University\College	
Taibah	248 (64.4%)
Al-Rayan	137 (35.6%)
Academic Year	
Second year	90 (23.4%)
Third year	80 (20.8%)
Fourth year	82 (21.3%)
Fifth year	87 (22.6%)
Sixth year	46 (11.9%)
Smoking	31 (8.1%)
BMI	
Underweight	56 (14.5%)
Normal	224 (58.2%)
Overweight	63 (16.4%)
Obese	35 (9.1%)

The mean age was 21.6 ± 1.5 years, with a range from 18 to 27 years and a median of 22. The majority were females 253 (65.7%) and 132 (34.3%) were males. Additionally, 248 (64.4%) were from Taibah University and 137 (35.6%) from Al-Rayan Colleges. The number of participants from the second to fifth academic year ranged from 80 (20.8%) to 90 (23.4%), while there were 46 sixth-year students (11.9%). The prevalence of smokers among participants was 31 (8.1%). Regarding the distribution of Body Mass Index (BMI), 56 (14.5%) were underweight, 224 (58.2%) were normal weight, 63 (16.4%) were overweight and 35 (9.1%) were obese.

We found that around 57 (14.8%) of all participants had GERD based on the GERDQ questionnaire. Table 2 demonstrates the association of demographic and general characteristics with GERD as follows: mean age of participants was 21.5 ± 1.5 years and ranged from 19 to 24 years with a median of 22 (P>0.05, Pearson Correlation used to test the relationship with GERD score). Females were 39 (68.4%) while 18 (31.6%) were males (P>0.05,

Chi-Square test used to compare between groups). The prevalence of underweight was 10 (17.9%), normal weight was 35 (62.5%), overweight was 7 (12.5%) and obese was 4 (7.1%), (P>0.05, Chi-Square test used to compare between groups).

Table 2: Association of demographic and general characteristics with GERD.

Parameter	GERD (n=57)	Non-GERD (n=328)	P value
Age(years) (mean [SD])	21.5 (1.5)	21.6 (1.5)	0.907
Gender †			
Male	18 (31.6%)	114 (34.8%)	0.641
Female	39 (68.4%)	214 (65.2%)	
BMI †			
Underweight	10 (17.9%)	46 (14.3%)	0.675
Normal	35 (62.5%)	189 (58.7%)	
Overweight	7 (12.5%)	56 (17.4%)	
Obese	4 (7.1%)	31 (9.6%)	

* Pearson Correlation used to test the correlation between age and GERD score

† Chi-Square test used to compare the Gender and BMI with GERD score

Figure 1 illustrates the academic year distribution among GERD group. The highest percentage was 16 (28%) in third-year students while the lowest was 8 (14%) in sixth-year students (P>0.05, ANOVA test used to compare between groups).

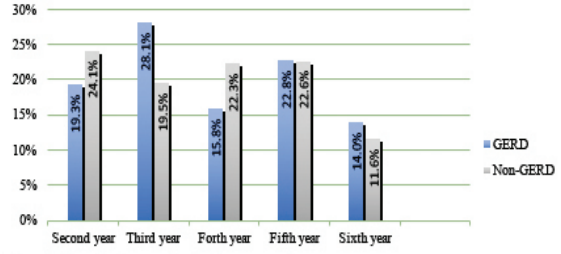


Figure 1: Academic year distribution among the groups.

Table 3 presents the prevalence of risk factors and their association with GERD as follows: the only significant risk factor was positive family history (P=0.001, Chi-Square test used to compare between groups), with a prevalence of 21 (36.8%). However, the association between GERD and the remaining risk factors was statistically insignificant (P>0.05, Chi-Square test used to compare between groups). The prevalence of special habits was as follows: there were 6 smokers (10.5%), 33 slept for fewer than 7 hours/day (57.9%), 25 eat their main meals within 10 min (43.9%), 38 skip breakfast (66.7%), and 18 sleep within an hour of eating dinner (31.6%). The prevalence of dietary habits was as follows: 24 regularly eat fast food (42.1%), 28 eat spicy food (49.1%), 33 eat fried food (57.9%), 29 regularly drink coffee (50.9%), 29 drink tea (50.9%), and 13 drink carbonated beverages (22.8%). Regarding exercise frequency, 22 (38.6%) of the GERD group do not exercise, 14 (24%) exercise once a week, 15 (26.3%) exercise 2-3 times per week and 6 (10.5%) exercise more than 3 times per week. In addition, 42 (73.7%) of the GERD group do not take any analgesics, 9 (15.8%) take Paracetamol, 3 (5.3%) take NSAIDs and 3 (5.3%) take both.

Table 3: Prevalence of risk factors and their association with GERD*.

Parameter	GERD (n=57)	Non-GERD (n=328)	P value
Family history	21 (36.8%)	57 (17%)	0.001
Special habits			
Smoking	6 (10.5%)	25 (7.6%)	0.457
Sleeping < 7 hours per day	33 (57.9%)	150 (45%)	0.09
Eating main meals within 10 min	25 (43.9%)	143 (43.6%)	0.971
Skipping breakfast	38 (66.7%)	212 (64.6%)	0.767
Sleep in <1 hour from eating dinner	18 (31.6%)	84 (25.6%)	0.346
Dietary habits			
Eating fast food regularly (≥3/week)	24 (42.1%)	165 (50.3%)	0.253
Eating spicy food regularly (≥3/week)	28 (49.1%)	137 (41.8%)	0.3
Eating fried food regularly (≥3/week)	33 (57.9%)	164 (50%)	0.271
Drinking coffee regularly (≥2 cup/day)	29 (50.9%)	165 (50.3%)	0.936
Drinking tea regularly (≥1 cup/day)	29 (50.9%)	138 (42.1%)	0.216
Drinking carbonated drinks regularly (≥1 / day)	13 (22.8%)	83 (25.3%)	0.687
Physical activity (e.g., running) >30 min			
Do not exercise	22 (38.6%)	135 (41.2%)	0.314
Exercise once a week	14 (24%)	85 85 (25.9%)	
Exercise 2-3 times a week	15 (26.3%)	55 55 (16.8%)	
Exercise >3 times /week	6 (10.5%)	53 (16.2%)	
Pain medications			
Not taking analgesics	42 (73.7%)	268 (81.7%)	10.214*
Paracetamol	9 (15.8%)	37 37 (11.3%)	
NSAIDs	3 (5.3%)	5 (1.5%)	
Take both	3 (5.3%)	18 (5.5%)	

* Chi-square test used to compare the categorical variables between the GERD and non-GERD groups.

Discussion

GERD is one of the disorders of gastrointestinal system that affects quality of life. Epidemiological data about the prevalence of GERD among the general population of Saudi Arabia, as reported by the most recent cross-sectional study published in 2019, was 17.8% [3]. This research is conducted to determine the prevalence of GERD and its risk factors among medical students in Medina, SA.

Our study results revealed that the prevalence of GERD among medical students was 14.8%. Similarly, a cross-sectional study on medical students in Chennai, South India reported a prevalence of 14.4%[12]. On the contrary, another cross-sectional study of medical students carried out at King Abdul-Aziz University in Rabigh and Jeddah showed a preva-

lence of 25.9% [9]. This higher prevalence might be attributed to their small sample size of 197 subjects. On the other hand, a lower prevalence of 5% was reported by a cross-sectional study among medical students in Puducherry, India [13]. This discrepancy is probably the result of different questionnaires used for diagnosis.

In the present study, we found no significant correlation between age and GERD score. In agreement with our results, two cross-sectional studies conducted in Saudi Arabia and India targeted university students, in which the samples consisted mainly of young individuals with a narrow age range, found similar results [4,14]. Nevertheless, a cross-sectional study among the general population of Saudi Arabia found that age seems to be a risk factor for GERD, being more prevalent in individuals over the age of 30 years [3].

Regarding gender, there was no statistical difference in GERD diagnosis between males and females. Similarly, two studies in Chennai and Puducherry targeting medical students found it to be insignificant[12,13]. Additionally, a systematic analysis of multiple studies conducted in United State, Europe and Asian countries in 2012 found no significant relationship with gender [15]. However, in the global systematic review and meta-analysis in 2020, there was a significant correlation with female gender [2].

Furthermore, there was no significant association between different BMI parameters and GERD in our study. In agreement with this, a cross-sectional study carried out in Jazan, Saudi Arabia concluded no association with GERD [16]. Conversely, there was a significant association between GERD and obesity (BMI >30 kg/m2) in a cross-sectional study among the community of Saudi Arabia [17]. This is likely due to the low prevalence of obesity in our sample (9.09%).

In our study, we found a statistically significant association between positive family history and GERD (P=0.001). In line with our findings, two cross-sectional studies, one from Jouf University, Saudi Arabia and another from Chennai, South India, found significant associations between GERD and family history [12,18]. To elaborate on that, twin-based studies demonstrated that there is a substantial genetic contribution that plays a role in GERD [19,20].

The association between GERD and special habits such as smoking, skipping breakfast, eating meals quickly and sleeping within 1 hour of having dinner was found to be insignificant in this research. In agreement with our results, a cross-sectional study carried out in the population of Qom, Iran reported that smoking, a lack of breakfast and having dinner close to bedtime were not associated with an increased

risk of GERD [21]. Regarding the speed of eating, an experimental study among patients with GERD in Turkey using 24-h intra-esophageal pH monitoring found no impact on reflux symptoms [22]. However, the Shaqra University study showed that eating meals quickly and sleeping within 1 hour of having dinner were significantly associated with GERD [1]. Moreover, the study in Chennai, South India reported a significant correlation between smoking and GERD [12]. Our results might be explained by the fact that smoking is less prevalent among participants (8.1%).

The correlation between GERD and dietary habits including fried and fast food was found to be insignificant in this research. In agreement with our findings, the Shaqra University study found no association between fried food and GERD; however, at the same time, fast food had a significant association with GERD [1]. Similar to our findings, a cross-sectional study in North Philadelphia states that there is no association with fast food [23]. However, the King Abdul-Aziz University study found that fried food was significantly associated with GERD [9].

Regarding coffee, tea, and carbonated drinks, their association with GERD was not significant. Correspondingly, a cross-sectional study including subjects who underwent endoscopy in Taiwan revealed that tea and coffee were not associated with reflux symptoms [24]. Also, the King Abdul-Aziz study found no correlation with carbonated drinks [9]. In contrast, the study by Puducherry demonstrated that the consumption of tea, coffee and carbonated drinks was significantly associated with the diagnosis of GERD [13]. These inconsistent findings could be due to the different questions used when assessing intake and the use of additives such as sugar or milk.

In our study, the level of physical activity was not correlated with GERD diagnosis. A cross-sectional study of patients with GERD in Poland concluded that levels of daily physical activity are not associated with symptoms of GERD [25]. In contrast, a cross-sectional study among the community of Saudi Arabia observed that an increase in the frequency of physical activity is significantly correlated with a decreased risk of reflux symptoms [17]. Another cross-sectional study conducted in Makkah, Saudi Arabia reported that one-three sessions of exercise per week is a significant risk factor for GERD [26]. These conflicting results are probably related to variations in assessing the intensity and type of physical activity across studies.

The results showed that the association between the use of NSAIDs and GERD was not significant. In agreement with our

results, a case-control study at Taipei Tzu Chi Hospital, Taiwan found it to be insignificant [27]. However, the global systematic review and meta-analysis showed a significant correlation ($P < 0.0001$) [2]. The insignificant finding in the current study is probably due to low prevalence of medication use (2.08%).

Our survey revealed no association between GERD score and academic year. In agreement with our results, a cross-sectional study at King Khaled University in Saudi Arabia concluded no significant relationship with GERD [28]. A population-based study in Shiraz, southern Iran established a significant association between GERD and psychological distress [29], while a study conducted on medical students in India reported a positive association between GERD and the final two years of medical school [14]. We assume that the insignificant difference between pre-clinical and clinical years may be due to the different continuous stressors that psychologically affect students and expose them to GERD risk regardless of their academic year.

The strengths of our study are the adequate sample size and being the first study conducted on medical students in Medina. The drawbacks of this study include the nature of the cross-sectional study, which represent self-reported data without differentiating between cause and effect of the factors of interest. Moreover, GERDQ is an initial diagnostic tool; however, it does not replace the confirmatory diagnostic procedure [11]. Further studies are needed to assess the prevalence and risk factors among medical students worldwide and in other regions of Saudi Arabia. In addition, another large-scale study is needed in Medina. Until now, there are no previous published studies that report or discuss the prevalence of GERD and its risk factors among medical students in Medina. The prevalence of GERD was 14.8%. A significant correlation was observed between GERD and positive family history. Emphasis should be focused on implementing interventions or setting campaigns aimed at increasing the awareness of GERD among medical students and encouraging healthy lifestyle.

Conflict of interest

None.

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not applicable.

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